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DESCRIPTION OF PRIMORDIAL FOSSILS FROM MOUNT STEPHENS, N. W. TERRITORY OF CANADA.

BY DR. C. ROMINGER.

My friend, Mr. Otto Klotz, in charge of the Astronomical work of the Canada Dominion, while engaged with geodetic measurements accidentally discovered this very interesting locality, which furnishes an abundance of well-preserved primordial fossils, particularly Trilobites, imbedded within a dark gray slate rock, of about 300 or 400 feet in thickness. Above the slate succeeds a large series of dolomitic rock beds, and below a very large belt of quartzites crops out; although the immediate contact of the quartzite with the slate is not seen in the locality. The specimens collected on this spot Mr. Klotz had the kindness to send to me. He gave others to the University of Michigan, his Alma Mater. Many of these fossils are remarkably well preserved, and nearly all of them are believed to be undescribed forms.

I have also to acknowledge here the liberality of Prof. A. Winchell, who allowed me the use of the specimens sent to the University. Among the collected fossils the most frequent form is an *Ogygia*, which, in honor of its discoverer, I propose to name

Ogygia Klotzi. Pl. I, fig. 1.

More than a dozen perfect specimens of it are on hand, the largest one of which measures 11 centimetres in length, by a width of 6 centimetres; others are smaller in all gradations down to a length of only 16 millimetres. One specimen, which is otherwise not perfect, has the head complete, with attached movable cheeks; in all the others the movable cheeks are missing.

The flat expanded specimens have suffered a degree of compression, as usually occurs with fossils preserved in a slate rock. In a general way the longitudinal diameters of the head, the thorax, and the pygidium are equal, but the latter is usually somewhat longer than either of the other body-divisions. The glabella is large, reaching almost the front margin, which projects as an elevated narrow rim.

The convexity of the glabella is only moderate, and the lateral furrows on it, three in number, are very shallow, often scarcely perceptible. Its sides are almost parallel, only slightly bulging out near the centre; width of the glabella measured across the upper edge of the palpebral rim is ⅓ of the entire diameter of the head at this place. Fixed cheeks are rather broad, the reniform palpebral lobe is margined by a projecting rim, which rim is seen continued under the form of a low rounded ruga extending from the upper angle of the eyes obliquely inward and upward, so as to meet the glabella at the third anterior lateral furrow of it. The occipital furrow and its lateral continuation across the cheeks is well marked. The movable cheeks terminate backward in a long spine reaching down to the third thoracic segment.

The facial suture line terminates posteriorly near the genal angles, anteriorly it intersects the margin on both sides of the glabella, quite a distance off from it, about perpendicular above the eye rim.

Thoracic segments in all the specimens, small or large, eight. The gently curved scabre-like ribs abruptly taper backward into a short spinose apex. Their centre bears a rounded broad depression, somewhat diagonal to the axis of the rib, and bordered on both sides by a projecting rounded ruga of which the anterior is more conspicuous than the posterior. The rachis is moderately convex, gently tapering backward; its width, compared with the length of the ribs, is as one and one-half to two in proportion. The pygidium, as above stated, exceeds the head or thorax slightly in length; it bears in the larger specimens eleven well-marked annulations, flanked by as many costal expansions which dilate considerably toward the margin, and bear in place of the central depression of the free ribs a rounded central ruga bordered on each side by a furrow; the edges of the anchylosed ribs are likewise indicated by an elevated rim.

The curvature of the pygidial ribs is much stronger than on the thorax, and their position to the rachis is more oblique, gradually increasing backwards, so that the hinder ribs of the pygidium meet the rachis under an acute angle. The edge of the pygidium is formed by a smooth convex rim, against which the costal rugæ abut.

In the figured specimen the movable cheeks were missing, and have been restored from another specimen with the head perfect.

Ogygia serrata. nov. sp Pl. I, figs. 2, *2a*.

There are four complete specimens in the collection, besides numerous fragmental ones; nearly all are about equal in size; the figured specimen is seven centimetres long, and five centimetres wide, measuring from one genal spine to the other.

Head, thorax, and pygidium of equal length.

General form of the head and course of the facial sutures correspond almost completely with the previously described species. The glabella of this form is somewhat broader and more prominent than in the former; also the glabellar furrows are more distinctly marked; they are three in number, the hinder one is the largest, directed obliquely inward and backward, but not reaching to the centre of the glabella.

The palpebral rim and the rugosity continued from it upward across the fixed cheeks are the same as in the former species.

The movable cheeks are protracted into long slender spines, which reach as far down as the fifth thoracic rib.

Rachis broad, almost equal in diameter with the length of the corresponding ribs, deducting their spiniform prolongations. The occipital ring terminates with a triangular monticulose prominence, overlapping the first thoracic ring, and likewise each one of all these annuli of the thorax, and the pygidium bears a strong spine on the median line.

The thorax of this species is, in all the specimens examined, composed of only seven segments.

The pygidium has five annulations with as many ribs corresponding to them. These ribs dilate considerably toward the margin, as in the former; but while in that, a smooth rounded rim edges the pygidium, in this form the principal ruga of each rib extends beyond the margin of the pygidium under the form of a strong acute spine, directed backward, so as to be almost parallel with the axis of the body. Five of such spines fringe each side of the pygidium; their size is gradually diminished toward the posterior end.

The hypostoma is in most of the specimens preserved, occupying its natural position. The shape is represented by one of the annexed figures and needs therefore no further verbal description.

Many loose, but much smaller hypostomas, of which I likewise figure a few (Pl. I, figs. *2b* and *2c*), were found scattered through the slate rock; to which of the associated trilobitic forms they belong, I was unable to ascertain.

Two other forms of Trilobites occur with the just described Ogygias, which in the configuration of their heads and in the course of the facial suture lines fully correspond with them, but they differ by the much smaller size of their pygidia in comparison with the size of the concerned thoracic divisions and the heads. A further difference is in the number of thoracic segments, which in them is nine instead of eight, and seven, as in the two first described typical forms of *Ogygia*.

The glabella of the latter also shows three lateral furrows, while in the two forms to be described, four very well marked glabellar furrows are observable.

These differences and principally the difference in the proportion of the size of head, thorax and pygidium, appear to me sufficient to distinguish these forms from the genus *Ogygia*, and I propose to apply to them the generic name *Embolimus*.

Embolimus spinosa, nov. sp. Pl. I, fig. 3.

Only one, almost perfect specimen of this form is in the collection, but the number of fragmental specimens observable in the slabs prove that this is not a rare species.

The specimen figured is 34 millimetres long; length of head 14 millimetres; length of thorax 15 millimetres; length of pygidium 5 millimetres, without counting the length of spinous processes.

The glabella is large, moderately convex, of equal width in all its length, reaching close to the front margin, which is formed by a narrow upturned rim.

The four glabellar furrows are well developed, none reaches the centre of the glabella, the hinder ones are the largest, running obliquely backward, the second and third furrows extend almost at right angles from the margin of the glabella, but the apex of the second is turned backward while the apex of the third furrow is curved forward. The fourth and smallest furrow is directed obliquely forward.

The occipital ring forms a triangular projection of the posterior margin, which is crowned with a stout short spine, also each of the thoracic annuli exhibits a faint indication of former ornamentation by a spine which is broken off in the specimen.

The pygidium has four sharp annulations with as many costal appendages, which, a short distance off from the rachis, are abruptly bent backward, tapering into long spines projecting over the pygidial margin in a direction parallel with the longitudinal axis of the body.

Also the thoracic ribs terminate with long spines directed obliquely backward. Each rib bears a deep depression in the central part, which, commencing near the spinose peripheral end, runs diagonally across the broader part of the ribs meeting the rachis near the upper end of each annulation; but previous to that, this depression sends off a side branch backward, which meets the posterior part of the same annulus, leaving between the two depressions a pointed triangular elevation in continuity with the convex portion of the annuli; the edges of the ribs project as elevated rounded rims, broadest in the middle, and tapering toward the rachis and toward the periphery, where the anterior rim is seen to constitute the body of the projecting spines.

Embolimus rotundata, nov. sp. Pl. I, figs. 4 and 5.

There is only one specimen in the collection which shows head, thorax and pygidium in connection, but the movable cheeks are missing. Other fragmentary specimens, however, exhibit the head complete. The proportions in the size of the three partitions of the body are:

Head, 13 millimetres; thorax, 14 millimetres; pygidium, 9 millimetres. Nine thoracic ribs, as in the former species; the pygidium has six well-marked annulations and corresponding pleural expansions, margin rounded, no spinose projections. The thoracic ribs are similar in configuration with those of the preceding species, but they terminate rather abruptly with short pointed ends.

The head likewise closely resembles the former species, with the difference that the glabella expands considerably toward the front end, while the glabella of the former is all its length of equal width. The movable cheeks, observable in one of the specimens, terminate backward in a long spine, reaching as far as the fourth thoracic articulation. The two figures represent a fragment with complete head and another incomplete specimen with the movable cheeks missing.

Monocephalus Salteri? Billings. Pl. I, fig. 6.

I have, with some doubt, identified a small specimen found in association with the others with the form described by Billings under this name. The minuteness of the fossil, and its being merely a cast without shell, prevents the observation of the more delicate structural details, but the general appearance of Billings' figure, as well as his description, are satisfactory proof to me that both fossils under consideration must be closely related, if not identical.

The specimen, of which a figure is subjoined, has a total length of 16 millimetres; length of head, 6 millimetres; length of thorax with *seven segments,* also 6 millimetres; length of pygidium, 4 millimetres.

The head of the specimen, deprived of the movable cheeks, bears a large glabella considerably dilating in front, with three distinct lateral furrows. The thoracic ribs are deeply excavated in the centre, and the adjoining margins of every rib project as high ridges with a dividing line along the crest. The annuli composing the pygidium are rather obsolete, but four sharp furrows, spreading from each side of the rachis, indicate its composition of at least four anchylosed segments.

Conocephalites cordilleræ, nov. sp. Pl. I, fig. 7.

Numerous specimens of this little trilobite occur in the collection; their average size in length is about 25 millimetres; the movable cheeks of the specimens are generally missing, otherwise the bodies are usually perfect.

Glabella conical, convex, provided with three lateral furrows, of which the posterior is the largest, quite oblique; occipital furrow deep. The glabella in its extension towards the front varies some, as between it and the upturned projecting rim of the front a broader or narrower strip of the fixed cheeks intervenes. The fixed cheeks are broad, margined with a small reniform burrelet at the palpebral angle of the facial line, and from the anterior end of this eye-rim a faint rugosity is seen to run across the fixed cheeks, toward the front part of the glabella, near its anterior sulcus.

Rachis uniformly tapering toward the tail-end, consisting in the thoracic part of seventeen segments, in the majority of specimens examined; but in one, evidently belonging to the same species, I counted only fourteen, and in another fifteen. The ribs are pretty straight, with a deep central depression and high projecting marginal rims, which are joining the rims of the neighboring ribs in a sharp linear groove. Each annulus of the rachis at its juncture with the ribs is decorated with a rounded node.

The entire surface of the body appears, in well-preserved specimens, covered with delicate papilli and granules.

The pygidium is very small, but clearly composed of at least three anchylosed segments.

Bathyurus? Pl. I, fig. 8.

A single specimen in the collection, or rather an impression of one, from which I prepared a gutta-percha cast, leaves me in doubt in regard to its generic affinities.

The smooth, rather convex glabella, without indentation by lateral furrows and the shape of the facial suture lines, resemble some forms described by Billings under the name *Bathyurus;* also the configuration of the other parts of the body would agree with these, but the number of thoracic segments in the specimen under observation is only six, while nine are claimed for *Bathyurus.* Not considering the material on hand as sufficient to decide whether this is a new generic type, or might be a form of *Bathyurus* with a normal number of thoracic segments, of which some became hidden by being shoved under the head, I content myself for the present by giving an exact copy of the gutta-percha cast formed in the impression of the slate-rock.

Agnostus. Pl. I, fig. 9. Compare *A. integer* Barr.

Many of these minute crustaceans are found scattered on the slabs of slate. They all apparently belong to one species.

The anterior valve differs from the posterior by the conical shape of its glabella terminating near the front margin in a bluntly pointed end; the median line of this glabella rises near the posterior end into a root-like crest, terminating in a backward projecting spinose protuberance; the posterior part of the glabella exhibits also an indentation by lateral furrows.

The rachis or central convex protuberance of the posterior valves is equilateral and not conical; the posterior end of it it abruptly rounded off; a deep furrow runs across this central protuberance on the posterior third of it; its larger anterior portion bears a short spinose projection.

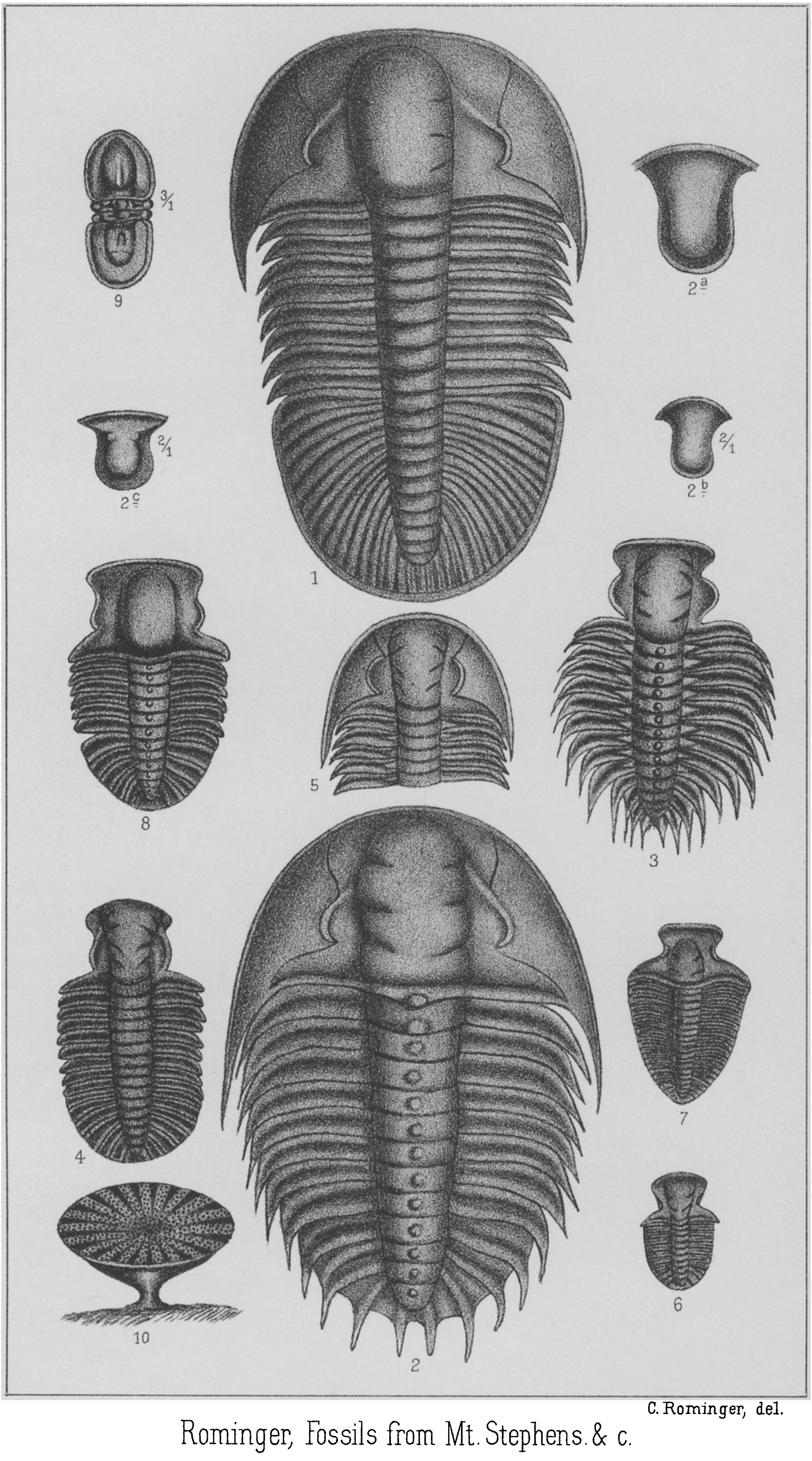
The two thoracic annuli are divided by furrows and constrictions into nodular partitions representing rachis and ribs, but of too small a size to be accurately represented by a description, or by figures. The subjoined figure of one of the specimens is enlarged three diameters.

Besides the described crustaceans, the slates inclose also numerous minute Brachiopods, several of which belong to the genus *Obolella.* One of these Obolellas, almost circular in outline, with marginal umbo, exhibits most delicate concentric lines of growth with ruffled edges, in addition to which also faint radial striæ emanating from the umbo are observable.

Other similarly rounded specimens of *Obolella* show fine concentric striation, but in comparison with the former may be considered smooth. Also more oval-shaped specimens of *Obolella* occur.

The genns *Orthis,* in a form similar to *Orthis pepinensis* is likewise represented; another form resembles *Kutorgina sculptilis* Meek. Small shells of the shape of *Leptæna* are also found, and one specimen similar to *Metoptoma.*

Some slender stems, consisting of shining carbonaceous matter, seem to belong to Grapholites. Finally I have to mention yet the occurrence of a form of *Theca* or *Hyolites,* of the same appearance as *Theca primordialis* figured by Hall. As I intend to examine this locality myself, as soon as the season allows, I expect to be able to give before long a more complete exhibition of the fauna inclosed within these slate-rocks.



C. Rominger, del.

Rominger, Fossils from Mt. Stephens. & c.